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ACTIVITIES OF POSTBREEDING LESSER SCAUP IN SOUTHWESTERN MANITOBA

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ABSTRACT.—Activities of postbreeding Lesser Scaup (*Aythya affinis*) were studied in the prairie-pothole region of southwestern Manitoba. Observations were divided among four time periods: (1) preflightless, (2) flightless, (3) postflightless, and (4) migratory. The only difference in activities between males and females occurred in the preflightless period: males spent more time in comfort activities and swimming and less time feeding than did females ($P < 0.05$). Time spent feeding was low during and after wing molt, and it increased markedly during fall migration. Scaup were most alert before molt and during fall migration. Time allocated to comfort activities was highest during the preflightless and flightless periods, and it declined through the postflightless and migratory periods, closely following molt intensity. Time budgets of postbreeding scaup were similar to those of postbreeding Redheads (*Aythya americana*), except for the greater time spent alert by scaup. Comparisons of other time-budget studies of Lesser Scaup in the same study area indicate that preflightless females in this study spent twice as much time feeding as did females with broods and that time devoted to feeding increased later in the preflightless period. *Received 9 July 1986, accepted 24 Jan. 1987.*

Lesser Scaup (*Aythya affinis*) are among the most abundant breeding diving ducks in the prairie-pothole region. Scaup also are present on these wetlands during spring, molt, and fall migrations, and during the late-summer molt. Previous studies have described the activities of scaup during the prebreeding (Siegfried 1974) and breeding periods (Afton 1983) in this region, but nothing is known of activities after the breeding period.

Most studies of postbreeding ducks have been conducted on areas where large flocks, comprised largely of males, congregate to molt (Bellrose 1976, Young 1977, Peterson 1980, Bailey 1982). Few studies have investigated the activities and ecology of postbreeding birds near the breeding areas or in smaller postbreeding flocks. Information about postbreeding females is particularly lacking. Unlike male ducks, females do not occur in large concentrations during the molt. Information on flightless birds is sparse because of their secretive behavior and the use of secluded habitats while flightless.

I report here on the time budget of postbreeding Lesser Scaup in southwestern Manitoba. Activities were monitored during (1) staging before molt or molt migration, (2) molt and the associated flightless period, and (3) fall migration.

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STUDY AREA AND METHODS

The study was conducted in the prairie-pothole region near Erickson, Manitoba, 240 km WNW of Winnipeg (Austin 1983). Wetlands consisted of shallow ephemeral ponds, seasonal or semipermanent ponds, and permanent lakes (0.5–60.0 ha). Most wetlands were bordered by sedges (*Carex* spp.) and native grasses. Shrubs and aspen (*Populus tremuloides*) were common around larger ponds and lakes. The climate, geology, hydrology, and land use of this region have been described elsewhere (Ehrlich et al. 1956, Johnson et al. 1970, Sunde and Barcia 1975).

The numbers and activities of Lesser Scaup were monitored by weekly censuses on 28 ponds in the study area from mid-May through October 1982 (Austin 1983); these censuses provided an index of the numbers of scaup present in the area. Further observations of birds were conducted on other ponds in the area. The presence of 20 previously marked individuals (Afton 1984) and 8 scaup marked early in this study facilitated the identification of postbreeding events and movements.

Observations were divided into four time periods, based primarily on the observed molt stage of the birds in the flock: (1) Preflightless period, when birds had completed or terminated breeding efforts but had not yet lost flight feathers; (2) Flightless period, when birds had soft growing primaries; (3) Postflightless period, when birds had new flight feathers, and were capable of flight, but were not yet part of migratory flocks; and (4) Migratory period, when birds were in staging flocks or were migrating through the area. Preflightless females were distinguished from incubating or brooding females by behavior (e.g., inactivity for long periods, associations with other female Lesser Scaup). All preflightless observations were conducted on birds in July that were in groups of 2 or more scaup. Flightless birds were obvious by the lack of primary feathers (i.e., observed during wing-flaps or by the different contours of the wing when folded on the body). Observations of birds in time-budgeted flocks and collections from these flocks (Austin 1983) indicated that birds were at all stages of flightlessness, and that these flocks may have included a few late preflightless or early preflightless birds. Observations of postflightless birds occurred before numbers of scaup in the area increased during fall migration.

Fledged juvenile scaup, identifiable with a spotting scope by their dark brown eyes (Trauger 1974), remained separate from adult scaup during the flightless and postflightless stages and were not included in scans. In the migratory stage, juveniles intermixed with adults and were occasionally included in the scans as females because of similarity in plumage. Most adult female scaup, however, could be distinguished from juveniles by their darker plumage and brighter eye color.

Groups of 2 or more Lesser Scaup were monitored from a car or blind for a minimum of 0.5 h and for as long as 4.0 h using binoculars or a spotting scope. Activities were classified as: alert, feed, swim, fly, rest, and comfort movements (Johnsgard 1965). Feeding included dive and dive-pause, dabble, food-handling, and drink. A bird was considered loafing rather than pausing between dives if it did not dive within 15 sec of observation. Comfort activities included preening, bathing, wing flap, wing or leg stretch, shake, or scratch (McKinney 1965). Small sample sizes precluded examination of data among different periods within the day.

I scanned flocks (Altmann 1974) every 3–5 min, and the sex and activity of each bird were recorded on cassette tape. Each individual was observed just long enough to determine the sex and immediate activity (Altmann 1974). The number of males and females underwater (diving) during each scan was determined from the known number of each sex present in the flock. The percentage of time spent in each activity for each sex was calculated for each observation session.

Activity data were transformed for analysis using the arcsine square-root function (Sned-

ecor and Cochran 1967). Nonparametric procedures were used because of the nonnormal distribution of the data and high, unequal variances even after transformation. Differences between activities of males and females were evaluated with Mann-Whitney *U*-tests (Conover 1980). I evaluated differences in activities among the four time periods using Kruskall-Wallis tests with multiple-comparison statistics (Conover 1980).

RESULTS

Preflightless period.—Postbreeding scaup were first observed in mid-July. Numbers of postbreeding scaup gradually increased through the end of July as females terminated breeding efforts and males abandoned their mates (Table 1). These birds formed flocks of 2–65 birds by the last 2 weeks of July. Molt of body feathers was apparent in most males by the end of June and in females after mid-July (Austin and Fredrickson 1986). Observations of 15 marked birds indicated that individuals moved frequently among ponds during the day. At night, most postbreeding scaup roosted on the 2 largest lakes in the area (Otter Lake, 1115 ha; Proven Lake, 1012 ha). Several marked females were last seen in the area 3–7 days after losing their nests, and no marked birds were sighted during their flightless stage. These marked females that nested around Erickson probably molted elsewhere. Based on the loss of marked birds and the decline in the number of scaup present in the area (Austin 1983), it appeared that most birds that terminated breeding in July left the Erickson area by the end of July. The origin of scaup that molted in the Erickson area is unknown.

Males and females differed significantly in time invested in 3 of 6 activities. Females spent more time feeding than did males (34.4 and 29.8%, respectively; $P < 0.05$), whereas males spent more time swimming and in comfort activities than females (12.1 vs 8.9%, and 20.2 vs 18.1%, respectively; both $P < 0.05$). Scaup spent more time alert in the preflightless period than in the flightless or postflightless periods (both sexes, $P < 0.05$) (Fig. 1).

Flightless period.—Most scaup in postbreeding flocks were flightless by the second week of August and regained flight by early September. Flocks ranged in size from 25 to 55 birds and usually remained separate from other species and broods on the ponds.

Allocation of time among activities was not significantly different between sexes ($P > 0.05$) during the flightless period. Flightless birds spent less time feeding, swimming, and alert and spent more time resting than in either the preflightless or migratory period ($P < 0.05$). Time spent alert declined by more than 50% from the preflightless period. For males, time spent swimming declined and time spent resting increased ($P < 0.05$), similar to levels of females in this period. Comfort activities accounted

TABLE 1

PERCENT OF TIME SPENT IN VARIOUS ACTIVITIES BY POSTBREEDING LESSER SCAUP NEAR ERICKSON, MANITOBA, CANADA, 1982 (N = NUMBER OF OBSERVATION SESSIONS; M = MALES; F = FEMALES)

	Preflightless		Flightless		Postflightless		Migratory	
Period	M	F	M	F	M	F	M	F
N	22	32	11	11	35	42	40	40
Total h	57.8	65.6	21.6	23.6	79.0	99.3	79.7	79.7
Feed	29.8	34.4	28.2	29.3	25.8	28.3	45.0	42.6
Rest	22.5	27.0	37.1	36.6	40.9	37.7	21.5	20.3
Comfort	23.4	21.2	23.9	23.0	17.6	19.0	10.7	12.5
Swim	12.1	8.9	7.3	7.1	12.5	11.3	17.4	17.7
Fly	0.1	0.1	0	0	0.1	0.1	0.3	0.3
Alert	11.7	8.0	3.4	3.8	2.2	2.7	4.2	4.9

for a greater proportion of time in the flightless period than in any other period but was not significantly ($P > 0.05$) greater than in the preflightless period.

Postflightless period.—Numbers of scaup declined 72% over the postflightless period from the high of 148 birds in the flightless period. Observations of other ponds in the region also showed a similar decline in the numbers of adult scaup. Only fledged juveniles and scattered small groups of postflightless birds or late-molting females were present during this period. Flocks observed for time-budgeting ranged in size from 6 to 57 birds with smaller flocks, comprised predominantly of females, occurring in the last half of the period. Patterns of activity were similar between the sexes ($P > 0.05$). The levels of feeding and resting were similar to those in the flightless period. Time spent in comfort activities declined and swimming increased; however, differences were significant ($P < 0.05$) only for males. Time spent alert was lowest during this period.

Migratory period.—Initial appearances of staging and migratory scaup occurred in late September. Flocks roosted on Otter and Proven lakes at night and moved to smaller wetlands during the day. Flocks on ponds ranged in size from 30 to 600 birds during the migratory period. During the last 3 weeks before freeze-up, large flocks of more than 800 scaup remained on the largest lake during the day. Final departures from the area occurred approximately 3–7 days before the final freeze-up in early November.

Allocation of time among activities was similar between the sexes ($P > 0.05$). Feeding activity increased markedly ($P < 0.01$) from the postflight-

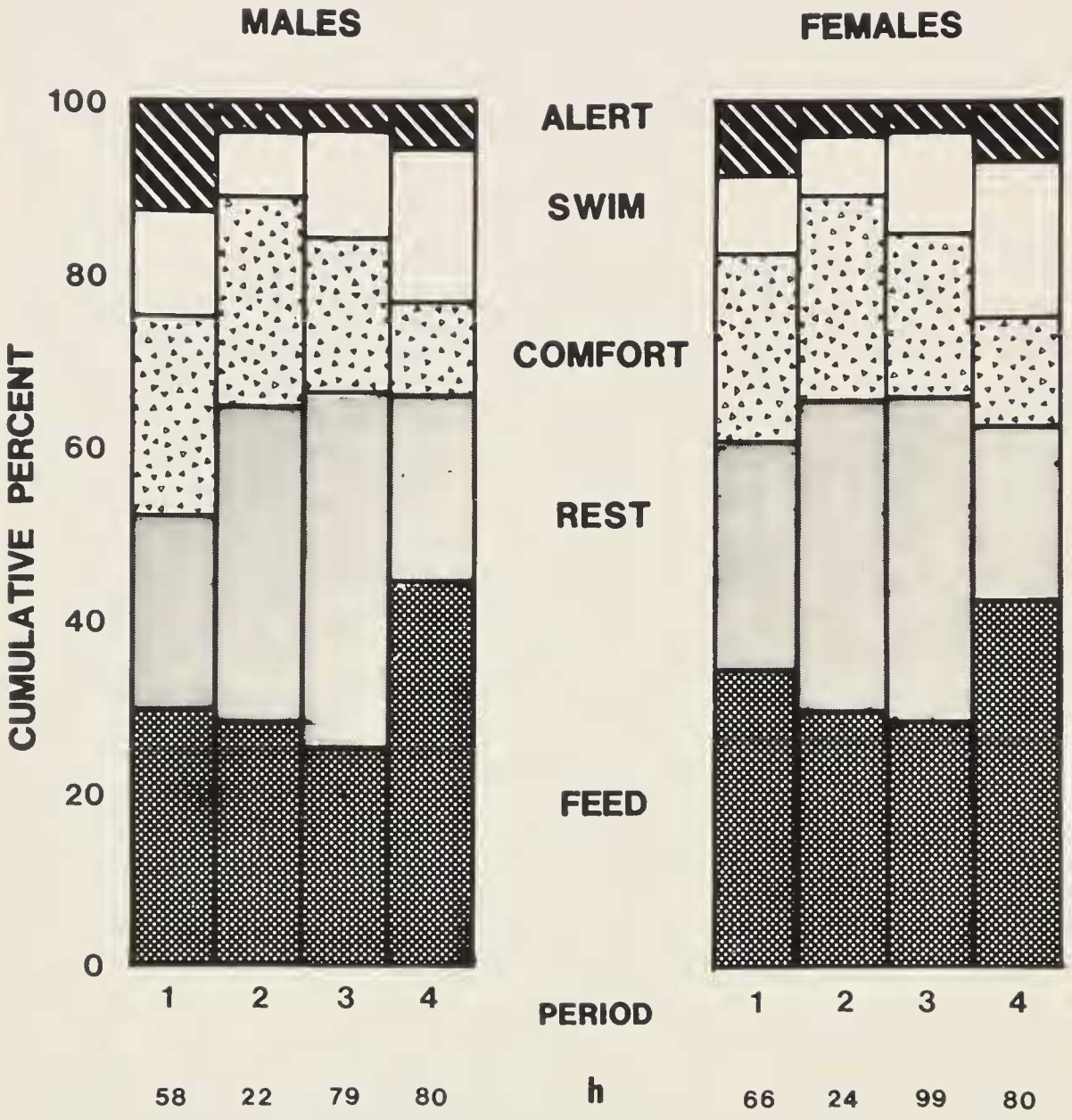

FIG. 1. Number of Lesser Scaup adults and broods present on 28 ponds near Erickson, Manitoba, Canada, 1982. Fledged juveniles were pooled with adults after September.

less period. Flocks were observed feeding intensively on ponds in the predawn hour after returning from the roost lakes; however, the low light conditions prohibited differentiation of the sexes and thus scan observations to quantify activities at these times. Swimming and flying activity also increased in this period ($P < 0.05$), whereas time devoted to comfort activities was lower ($P < 0.05$) than in all other periods.

DISCUSSION

The seasonal pattern of activities of postbreeding Lesser Scaup varied according to the stage of molt and the initiation of migration. Feeding

was low during and immediately after the wing molt and increased markedly during fall migration, corresponding to lipogenesis and increasing body weight in preparation for migration (Austin 1983). Time allocated to comfort activities, composed largely of preening, was positively related to the level of molt intensity. Molt intensity was greatest during the flightless and postflightless periods and declined markedly in migratory birds as molt was completed (Austin and Fredrickson 1986). Birds spent more time resting during the flightless period, when time allocated to feeding and alert were low; they spent the least time resting in the migratory period when feeding, flight, and alert activities were high. Scaup were most alert before both the molt and fall migration. Migratory restlessness before both the molt and fall migration is reflected in the greater time spent alert and swimming, particularly in fall. These activities have been reported in premigratory Redheads (*Aythya americana*) (Bailey 1982), captive Blue-winged Teal (*Anas discors*) (Owen 1968), and captive Gadwall (*Anas strepera*) (Oring 1969).

The differences in activities between sexes in the preflightless period may be due to the earlier onset of molt in males (Palmer 1976) and differences in body condition following the breeding season (Austin 1983). Plumage changes in males from alternate to the basic plumage were apparent in late June, whereas the first indication of molt in females occurred no earlier than mid-July (Austin and Fredrickson 1986). Thus molt in males during the preflightless period (July) is probably more advanced than in females, and the greater time spent preening by males may reflect this. Differences in time spent foraging in the preflightless period may be related to differences in body condition at the end of the breeding season. In Ring-necked Ducks (*Aythya collaris*), breeding males regained body weight and metabolic reserves in mid-June and July, whereas breeding females did not begin to regain body weight and reserves until mid-July (Hohman 1986). Body weights and metabolic reserves of female scaup were low in the period immediately following breeding (Austin 1983), and females spent significantly more time feeding than did preflightless males.

Allocation of time among activities in this study was compared with that in 2 other studies of Lesser Scaup conducted in southern Manitoba. Paired males staging on the Delta Marsh in spring spent 35% of their time foraging, or about 10% less time feeding than did males during fall migration (Siegfried 1974, based on individual birds; this study). Unpaired males in spring spent much more time resting (67%) and only 15% of their time foraging. Prebreeding female scaup spent about the same amount of time feeding as did migratory birds in fall, but they spent less time swimming and more time at rest. Although these females were prob-

ably undergoing the prebasic molt (Palmer 1976), time spent preening was less than half that in the preflightless and flightless periods (Siegfried 1974, this study). Brood females in the Erickson area allocated considerable time to the care of ducklings; a much higher percentage of time was spent alert (20.4%), and less time was spent feeding (17.6%) or resting (21.5%) than during the postbreeding period (Afton 1983, adjusted values; this study). In contrast, broodless females during this same time period also spent only 17.2% of their time feeding, but over 50% of their time resting. Afton's broodless females (known failed nesters) are probably equivalent to preflightless birds of this study, but his observations were most likely conducted earlier in their postbreeding or preflightless period than were my observations (A. Afton, pers. comm.) (e.g., immediately after the loss of the nest). Thus, based on the results from Afton (1983) and this study, preflightless females appear to spend twice as much time foraging as do brood females, and the time devoted to feeding increases later in the preflightless period.

The pattern of postbreeding activities for Lesser Scaup is similar to that of Redheads (Bailey 1982). Comparison between the two species, by sex, of time spent feeding and preening indicates a very similar pattern and amount of time for the period during and after the molt. Redheads fed primarily in the evening or at night and rested during the day. Night feeding and diurnal roosting have also been reported for captive molting Gadwall (Oring 1969). Whether scaup fed at night and on the large roost lakes is unknown. However, the low levels and absence of gain in body mass and fat levels in the flightless and postflightless periods (Austin 1983) suggests that the low diurnal feeding times are probably representative of the total time spent feeding.

The most marked differences between scaup and Redheads is in time allocated to alert and rest. Time spent alert by Redheads averaged $<0.4\%$, whereas scaup spent 2.7–8.0% of their time alert. The greater alertness and less time spent resting may reflect the differences in habitat and disturbance factors between the two areas. Most small ponds in the Erickson area are adjacent to farmland, roads, or houses and, therefore, are more subject to human disturbances than secluded southern boreal lakes of Manitoba used by postbreeding Redheads in Bailey's study. Hunting activity also is probably higher in the Erickson area because of the area's proximity to population centers and because of better access to most ponds. Waterfowl traditionally molt in secluded areas, presumably to avoid disturbances during the flightless period when birds cannot move far and are vulnerable to disturbances or predation (Salomonsen 1968). The impact of human disturbances on time-budgets and habitat use patterns of scaup in the Erickson area is uncertain.

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